

REMARKS

Applicants thank Examiner Koslow for her time and consideration of the present application during the personal interview of December 19, 2007 with the undersigned.

During the interview a proposed amendment to the claims was discussed, as well as the included declaration and articles as evidence of novelty and non-obviousness. Examiner Koslow stated that she would consider the amendment, declaration and secondary evidence if filed along with an RCE.

Accordingly, this amendment is filed along with a Request for Continued Examination. The amendment is believed to be fully responsive to the outstanding Official Action and to places the application in condition for allowance.

Claims 113, 114, and 124 are amended.

Claims 125 and 126 are new.

Support for the amended and new claims may be found generally throughout the specification, for example, at page 3, lines 9-11, page 6, lines 5-9, pages 7, lines 17-18, page 9, lines 14-29, and the Examples.

Claims 100-112 are cancelled without prejudice, as applicants reserve the right to file one or more divisional application directed to the non-elected subject matter.

Claims 113-126 remain pending in the application.

The specification is amended at page 17, line 10 to disclose the formula WCR<sub>c</sub>V. Applicants believe that no new

matter has been added to the specification. Specification page 17, lines 5-17 discloses that  $X_2$  may be " $OH^-$ ,  $F^-$ ,  $R_cBZ_3^-$ ,  $N_3^-$ ,  $CN^-$ , or \_\_\_\_\_" (emphasis added) and defines V and W values, in a manner consistent with original claim 24. However, there is no formula on page 17 with variables V and W. Thus, applicants believe that it is apparent that  $WCR_cV$  was inadvertently omitted from page 17. Thus, the specification is amended to correct this informality.

The Official Action objects to the disclosure. This objection is respectfully traversed.

The position of the Official Action is that that pages 6 and 13 teach  $Y^-F$  is selected from the anions F, OH, CN, RO and RS, but there is no F group.

Applicants agree that when k is equal to 0, the functional anion " $Y^-(L)_k-F_i$ ", corresponds to a single anion selected from the anions F, OH, CN, RO and RS. That is, functional anions are described as corresponding to an ionic entity optionally linked via an L arm, to at least one function  $F_i$ , represented by " $Y^-(L)_k-F_i$ ". Specification page 7, lines 17 and 18, discloses that for the term " $Y^-$ ", the dash "-" represents the optional bond between the anionic entity and the L arm. At  $k=0$ , there is no L arm linking the functional group, and the anion is represented by  $Y^-(L)_0-F_i$ , or simply the form  $Y^-F_i$ . Absent the L arm linking and given the fact that the dash "-"

represents the optional bond between the anionic entity and the L arm, there is no  $F_i$  group attached to the anion, and the anion is a non-functionalized anion. Instead, a functional group would be anchored on the cation of the functionalized salt. Applicants believe that this is clear, when read in the context of pages 6 and 13.

Therefore, withdrawal of the objection is respectfully requested.

Claims 114-124 are rejected under 35 U.S.C. 112, first paragraph, for not complying with the written description requirement. This rejection is respectfully traversed.

The position of the Official Action is that new matter was introduced by deleting the recitation directed to  $Y^-F_i$ ,  $Y^-(L)_0F_i$ , as the claims read on any anion bonded to any claimed F. However, as discussed above, when  $k=0$ , specification pages 6 and 13 disclose that  $Y^-F_i$ , where the "-" represents a bond with an L arm, as an expression represents a single anion. The specification also states that  $Y^-F_i$  is possibly representing a single anions chosen from, in particular, F, OH, CN, RO and RS. Accordingly the specification does not limit the anion to F, OH, CN, RO and RS for  $k=0$ .

Moreover, new claims 125 and 126 are added to recite these particular anions.

Therefore, withdrawal of the rejection is respectfully requested.

Claims 113 and 123 are rejected under 35 U.S.C. 112, second paragraph, for being indefinite. The rejection is respectfully traversed.

Specifically, claim 113 is rejected for reciting that either the cation and/or anion of the ionic liquid  $A_1^+X_1^-$  is functionalized. The position of the Official Action is that this is contrary to the definition for the individual ions. However, the present specification describes either or both ions may be functionalized, e.g., at page 2, lines 26-33 and page 9, lines 14-19.

Claim 123 is rejected for reciting anions, i.e.,  $N_3$ ,  $R_cBZ_3$ , and  $WCR_cV$ , which are not found in the list of accepted  $X_2$ . However  $N_3$  and  $R_cBZ_3$  are explicitly disclosed as possible  $X_2$  anions on page 17, lines 5-10. However,  $WCR_cV$  is, at the very least, supported by original claim 24. Moreover, as discussed previously, applicants respectfully submit that  $WCR_cV$  was inadvertently omitted from the specification on page 17, which is now amended in a manner consistent with original claim 24. Thus, claim 123 is definite, in view of the originally filed application.

Therefore, withdrawal of the rejection is respectfully requested.

Claims 114-124 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent application publication 2002/0010291 (US'291). This rejection is respectfully traversed.

US '291 is offered for teaching a mixture including a functionalized ionic liquid. The position of the Official Action is that this teaching suggests any combination of liquids, which allows for mixture where the non-functionalized ionic liquid acts as the matrix and the functionalized ionic liquid is dissolved therein.

However, US '291 fails to disclose or suggest the claimed invention for at least three reasons described below:

I. The functionalized salt is not a soluble reaction support.

US '291 discloses employing an ionic liquid in the formation of poly-isobutylenes. Ionic liquids containing functionalized groups act as or bind to a catalyst or a scavenger. See, e.g., paragraphs 53 and 54.

US '291 discloses a mixture of an ionic liquid containing a functional group and a non-functionalized ionic liquid is used to form a useful catalyst composition (paragraph 54). US '291 defines the catalysts as having the same properties as classic initiators and co-initiators (paragraph 12). A classic catalyst achieves a chemical reaction on another molecule. Accordingly, the catalysts are not further functionalized. The catalysts of US '291 do not provide a soluble

reaction support that catches of one or more molecules, functionalizes said molecules, and releases the functionalized molecules after a reaction sequence, as recited in independent claims 113, 114, and 124.

As to the scavengers disclosed by US '291, US '291 defines a scavenger as a compound that does not interfere with the reaction but reacts with impurities/undesirable species (paragraph 31). Accordingly, a scavenger is used as a purification method, and a scavenger is eliminated from the reaction mixture, without further functionalization. Indeed, the scavengers could not provide a soluble reaction support that catches of one or more molecules, functionalizes said molecules, and releases the functionalized molecules after a reaction sequence, as recited in independent claims 113, 114, and 124, as this would be contrary to the very purpose of a scavenger.

## II. The functionalized salt is not recyclable.

When a classic catalyst is recovered (when recyclable) at the end of the chemical reaction, the catalyst is in its initial state. However, US '291 fails to suggest that recycling of the catalysts is possible, or, as discussed above, that the catalyst is further functionalized. Rather, US '291 appears to suggest that the catalyst is not recyclable, as US '291 discloses that the invention provides an easy method for removing the product from unwanted catalyst. See, e.g., paragraph 58.

Moreover, the scavenger feature of US '291 further suggests that the functionalized salt is not recyclable. The scavenger reacts with impurities/undesirable species, and then is removed from the reaction mixture. Recycling or reusing a scavenger reacted with impurities/undesirable species, would be contrary to the intended purpose of a scavenger.

Thus, US '291 fails to disclose or suggest a recyclable functionalized salt, as recited in independent claims 113, 114, and 124.

III. The functionalized salt does not form a homogeneous phase with the liquid matrix.

US '291 fails to disclose a homogeneous mixture. Taken as whole, US '291 solely suggests a heterogeneous mixture.

For example, in paragraph 58, US '291 refers to the reaction mixture composition as providing an easy method for removing products and unwanted catalyst, e.g., by decanting. A homogeneous mixture would not be easily separated by decanting.

The Examples also teach heterogeneous mixture, as Example 1 shows isobutylene, which is not soluble in the ionic liquid 1-methyl-3-ethylimidazolium aluminum tetrachloride between -40°C and -20°C, and Example 2 shows the catalyst composition containing ethylaluminum dichloride and the ionic liquid 1-methyl-3-ethylimidazolium aluminum tetrachloride, which is not soluble in the co-solvent hexane.

Thus, US '291 fails to disclose or suggest a functionalized salt forming a homogeneous phase with the liquid matrix, as recited in claims 113, 114, and 124.

Therefore, there is no motivation, teaching or suggestion for one skilled in the art to use the functionalized ionic liquid of US '291, the catalyst bound to the functionalized ionic liquid, or the scavenger bound to the functionalized ionic liquid as a soluble reaction support that is recyclable and part of a homogeneous mixture.

Indeed, the novelty and non-obviousness of the claimed recyclable, soluble reaction support for organic synthesis in a homogeneous phase is further evidenced by the acknowledgment of peer-reviewed articles, included with the Declaration under Rule 132 filed with this amendment. For example, the article from *Analytical Chemistry*, acknowledges that the compositions according to the claimed invention provide the major advantage of supported organic synthesis in a homogeneous solution.

Therefore, in view of the above, US '291 cannot render obvious claim 113-126, and withdrawal of the rejection is respectfully requested.

In view of the amendment to the claims and the preceding remarks, applicants believe that the present application is in condition for allowance at the time of the next official action. Allowance and passage to issue on that basis is respectfully requested.



The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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**APPENDIX:**

The Appendix includes the following item(s):

- a 37 CFR 1.132 Declaration